

SPoRT: Overview, Paradigm, and Product Examples

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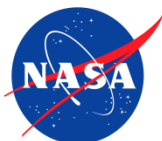
3rd NOAA Testbed and Proving Ground Workshop

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David Skaggs Research Center, Boulder, CO



transitioning unique NASA data and research technologies to operations



Outline

- SPoRT Overview, Paradigm, and Testbed Role
- Example Testbed Product
- Example GOES-R PG Products
- Example JPSS PG Products
- Status of Current SPoRT Proving Ground activities
- Upcoming Work

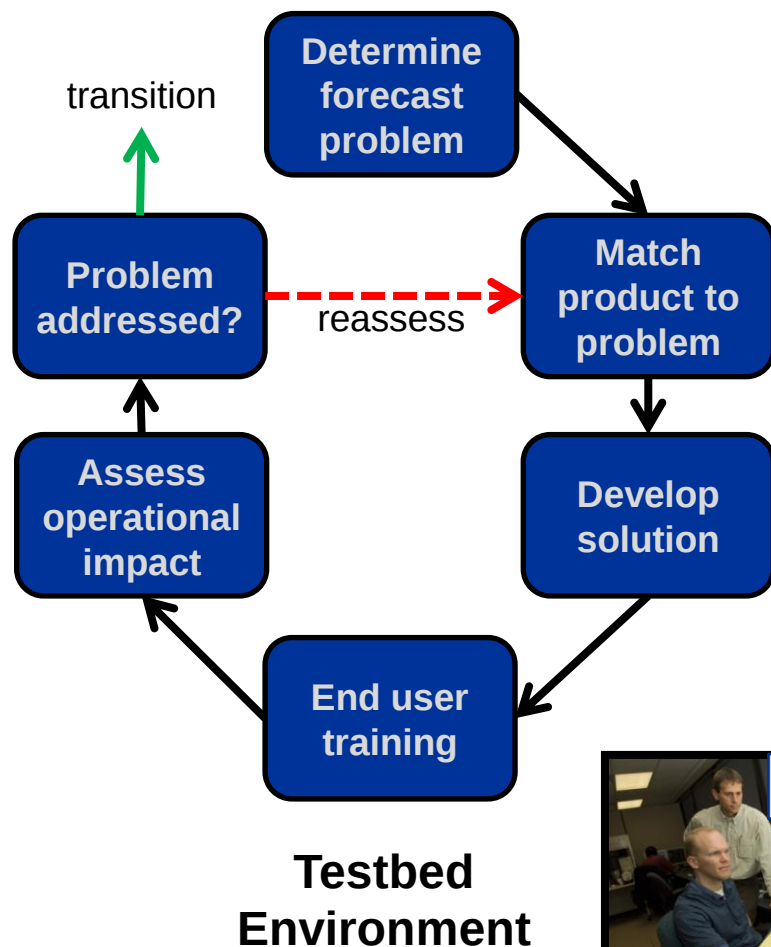
Short-term Prediction Research and Transition (SPoRT) Center

Mission: Apply measurement systems and unique Earth science research to improve the accuracy of short-term weather prediction at the regional and local scale

- Located at Marshall Space Flight Center in Huntsville, AL as part of the Earth Science Office
- Collocated with Huntsville NWS WFO and UAHuntsville earth science program
- Combination of NASA and NOAA civil servants, UAHuntsville employees, contractor staff, and graduate students
- Expertise in remote sensing, lightning, modeling, and data assimilation
- SPoRT activities began in 2002; first product to Southern Region WFO AWIPS in 2003
- Now have a suite of 30+ satellite-derived, analysis, and forecast products that are disseminated in real time *via* public FTP or LDM



SPoRT Paradigm: Ensuring Successful R2O

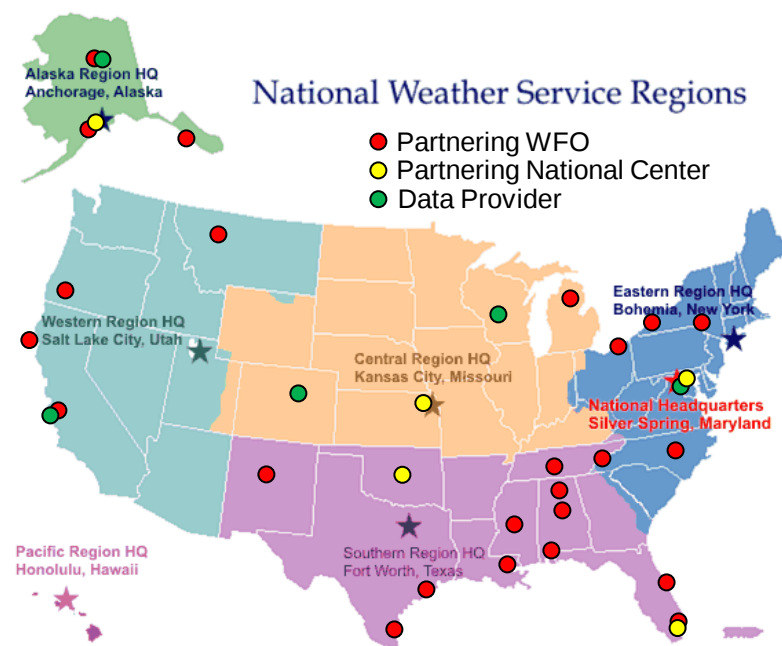


- Bridge the “Valley of Death”
- Can’t just “throw data over the fence”
 - Match observations to forecast challenges
 - Maintain interactive partnerships with help of specific advocates or “satellite champions”
 - Integrate into user decision support tools (AWIPS, N-AWIPS, AWIPS II)
 - Create forecaster training on product utility
 - Perform targeted product assessments with close collaborating partners
- Other groups have adopted paradigm



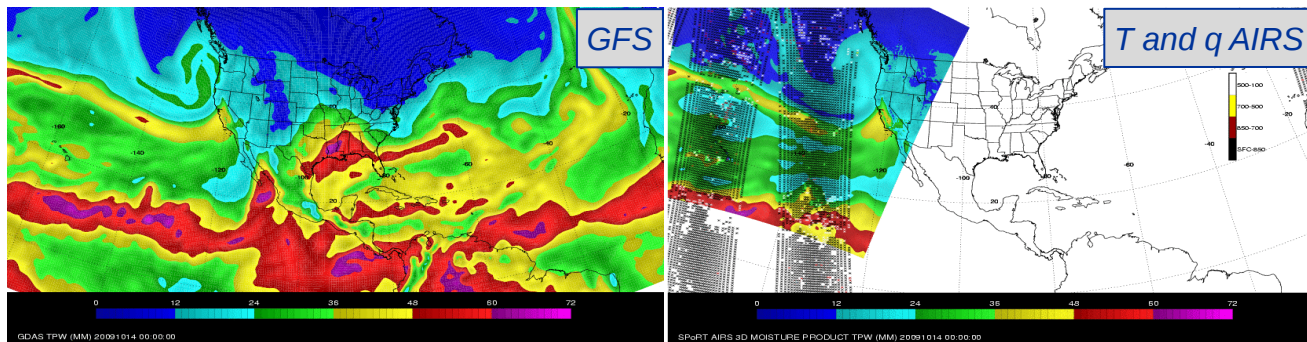
SPoRT's Role As A Testbed

- Use legacy/research instruments and capabilities to demonstrate utility of upcoming NOAA operational instruments to operational forecasters
 - LMA, LDAR → GLM
 - MODIS, VIIRS on Suomi-NPP → VIIRS on JPSS, ABI
 - AIRS, IASI, CrIS on Suomi-NPP → CrIS on JPSS
- Use innovative instrumentation to solve ever-evolving list of forecast challenges
 - Heavily involved in GOES-R and JPSS PG activities
- AWIPS II Development
 - Produce and transition AWIPS II modules to display SPoRT data products
 - Successfully transitioned AWIPS II plug-in to view SPoRT MODIS imagery products to the Houston WFO
- Focus on developing partnerships with mutual benefit for both SPoRT and NWS
 - Regular interaction with 20+ WFOs, 5 NCEP Centers/Testbeds
 - Initial focus on OCONUS offices



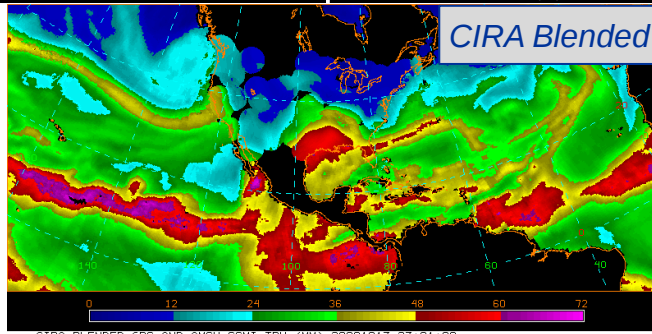
Current SPoRT Testbed Product: AIRS-Enhanced 3D Moisture Analysis

- Example of analysis/forecast product developed by SPoRT
- AIRS T and q profiles add detail around clouds not available in operational radiance assimilation resulting in more favorable moisture analysis over Pacific than real-time GFS for selected cases
- AIRS is a legacy instrument for CrIS on Suomi-NPP and JPSS



- Evaluate integrated water vapor (and fluxes) in specific layers
- Collaborating with HMT to evaluate product(s) that can be made from analysis/model forecasts

**Total Precipitable
Water valid at
~0000 UTC on
2009 October 14**



Current SPoRT GOES-R PG Product: MODIS/GOES Hybrid

- Prepare forecasters for GOES-R Advanced Baseline Imager (ABI)
- MODIS used to replicate the spatial resolution of ABI, but polar orbit limits its temporal resolution
- Combine MODIS and GOES to simulate GOES-R ABI capabilities
- MODIS images are inlaid into GOES imagery at the appropriate times so WFO users get the continuity of animation **AND** the clarity of higher resolution
- Visible, Long- and Short-wave IR, Water Vapor, Fog, and select RGB products are available in hybrid format

MODIS data
enhances cloud
features preparing
users for ABI

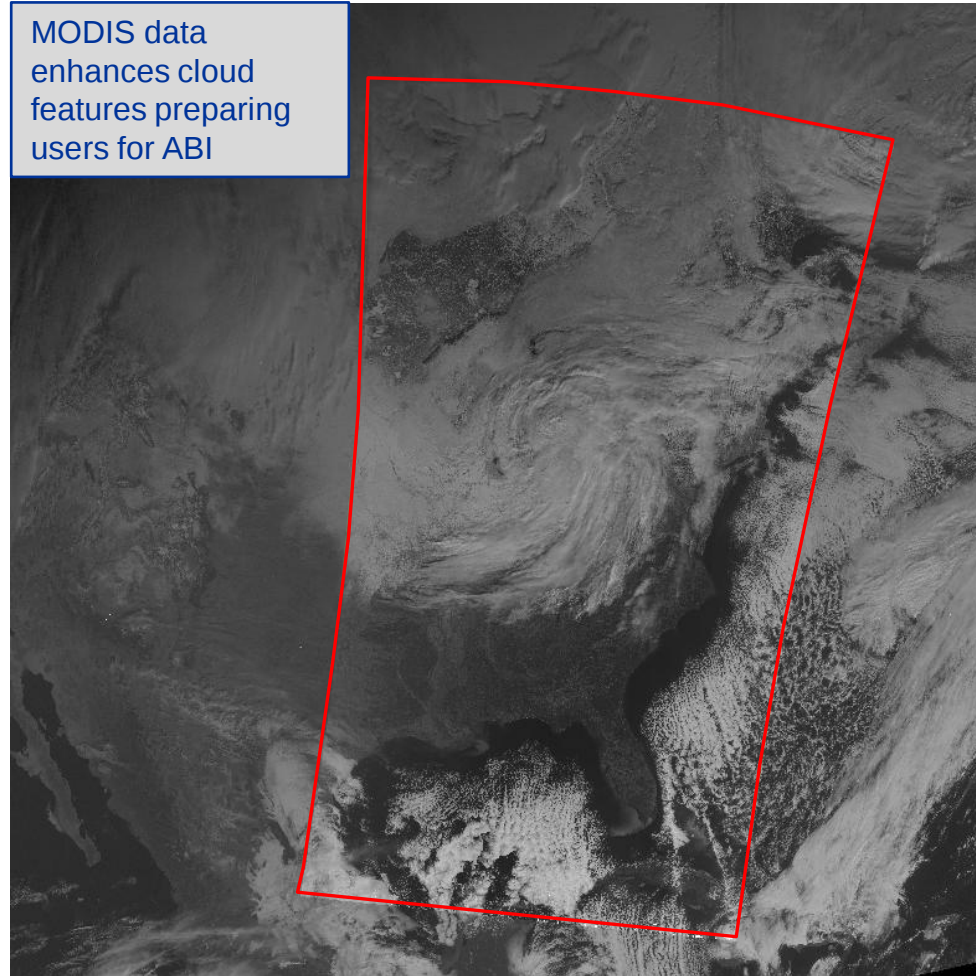
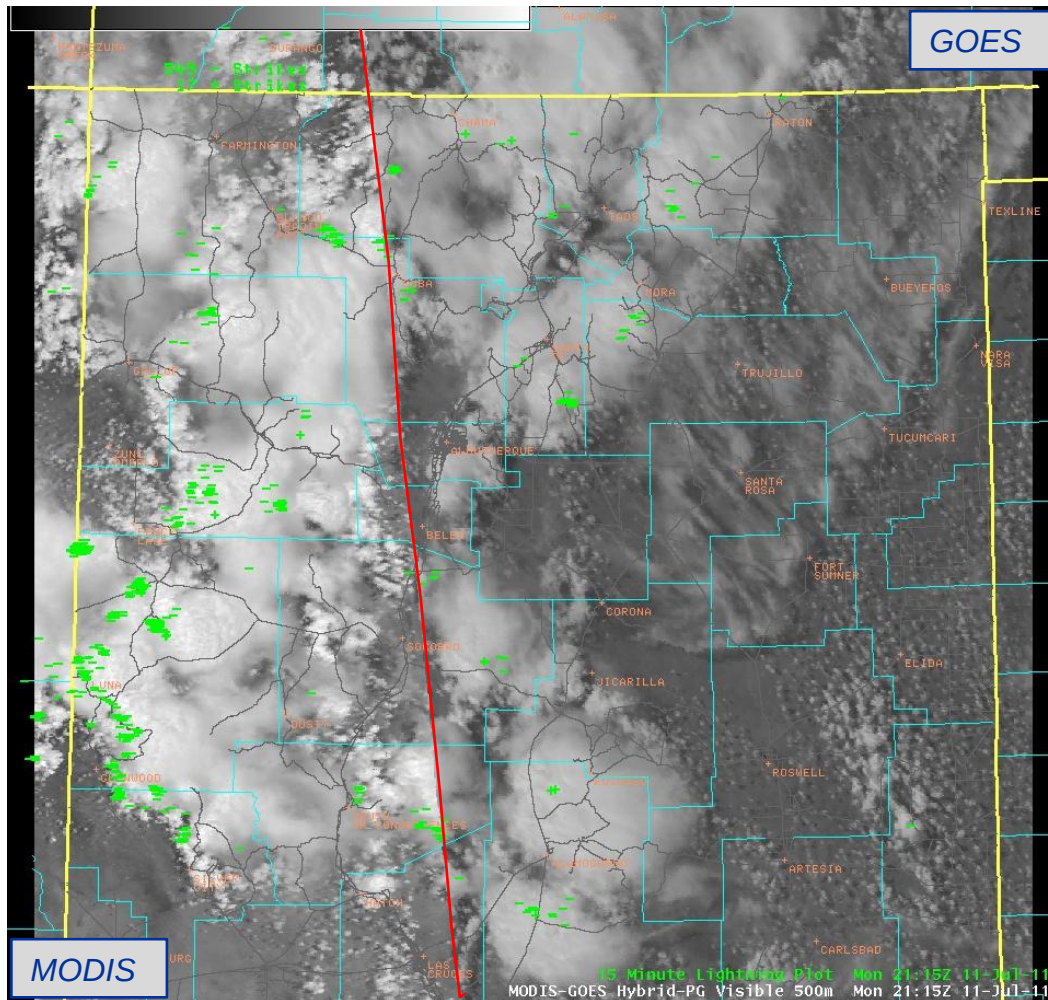


Image from Matt Smith

MODIS/GOES Hybrid Testimonial

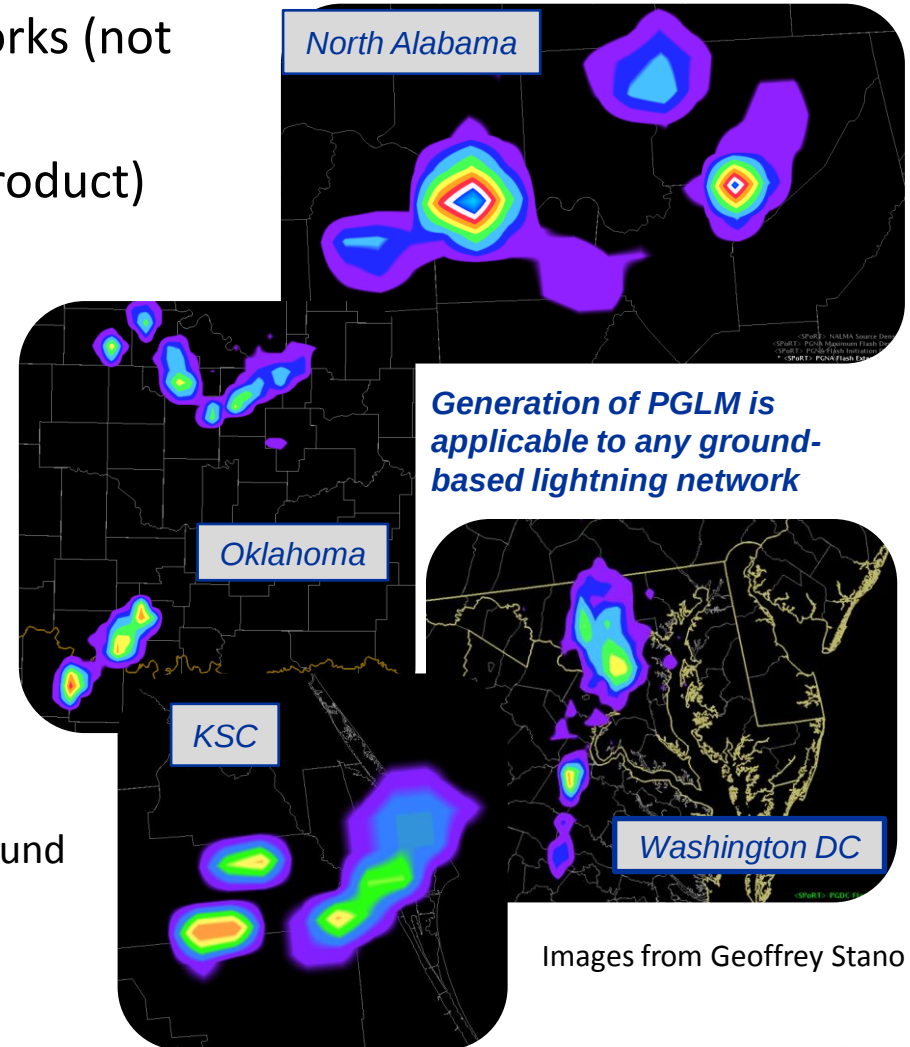


“On July 11th at 2115 UTC the hybrid visible captured a stunning comparison of monsoon convective activity over New Mexico. Note the extraordinary detail of the cloud structures over western NM compared to the more smoothed look to the convective clouds over eastern NM. The convective development over western NM in this image follows our topographical features very well as expected during the early to mid afternoon period.”

--WWoS Blog Post by ABQ WFO

Current SPoRT GOES-R PG Product: Pseudo GLM

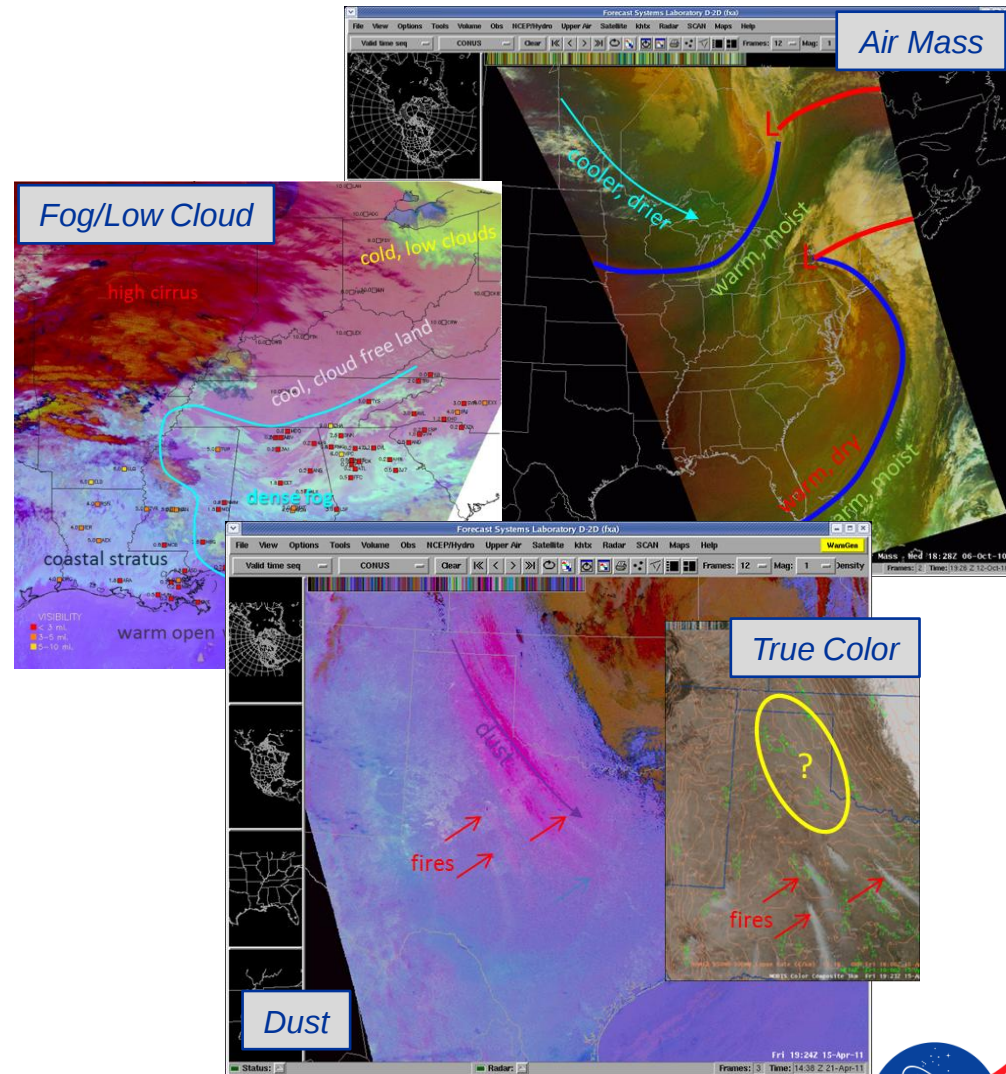
- Uses ground-based VHF lightning networks (not optical data like GLM)
- Counts lightning flashes (Level 3 GLM product)
- Used specifically for training purposes:
 - Understanding concept of total lightning
 - Develop forecaster familiarity with visualizations of products to come from GLM including flash rate trends
 - Receive forecaster feedback
 - Assist operational integration
- Product has been evaluated by WFOs, HWT, and AWC
 - “Preceded first observations for cloud-to-ground lightning”
 - “...heads-up on increase in storm severity”



Images from Geoffrey Stano

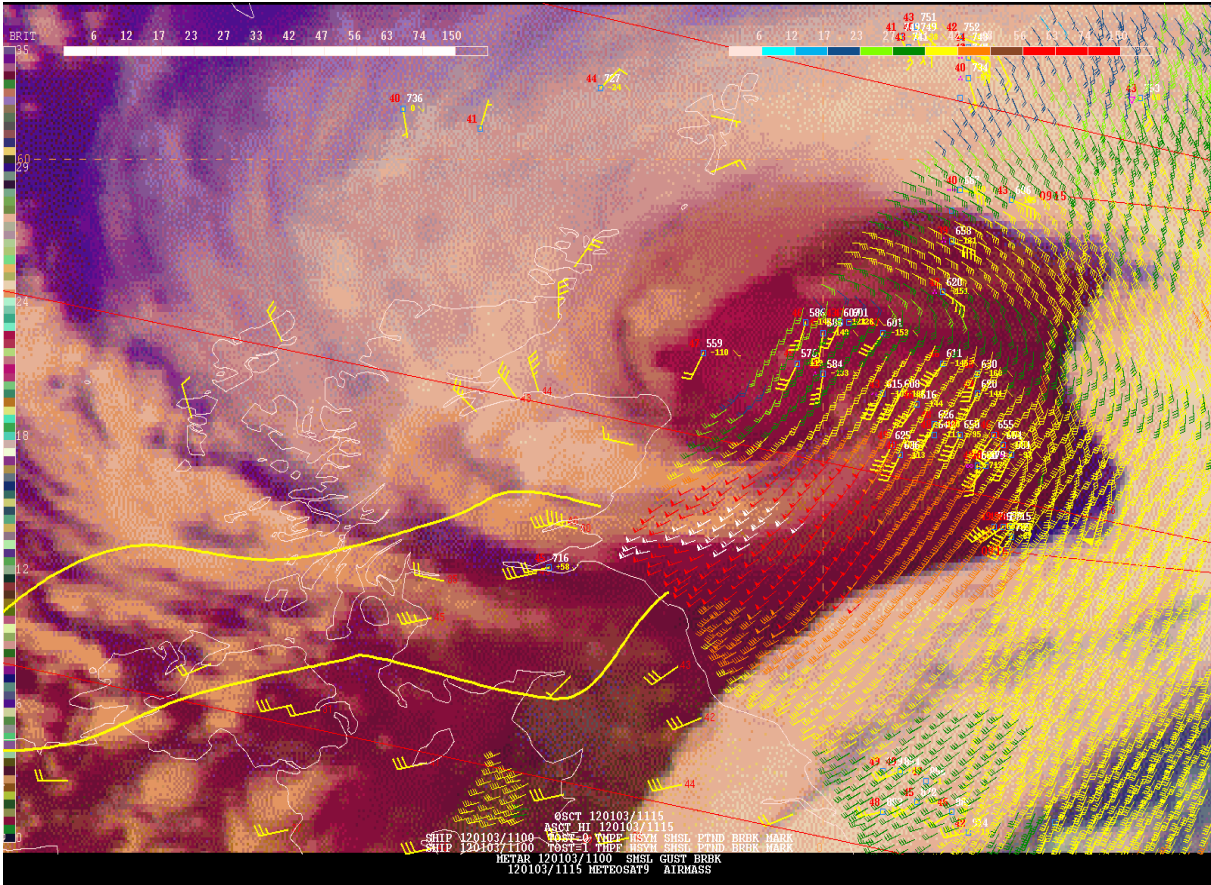
Current SPoRT GOES-R/JPSS PG Products: MODIS/SEVIRI RGB Multispectral Imagery

- SPoRT is collaborating with CIRA to develop and transition several multispectral satellite (RGB) images for evaluation and use by partners
- RGB imagery combine several imager bands into vibrant composites where resulting colors are related to features of interest
- Products are currently developed from SEVIRI and MODIS, with planned expansion to VIIRS and the incorporation of other data from CrIS and ATMS
- Products are used and evaluated by WFOs, NHC, and OPC/HPC



RGB Multispectral Imagery Testimonial

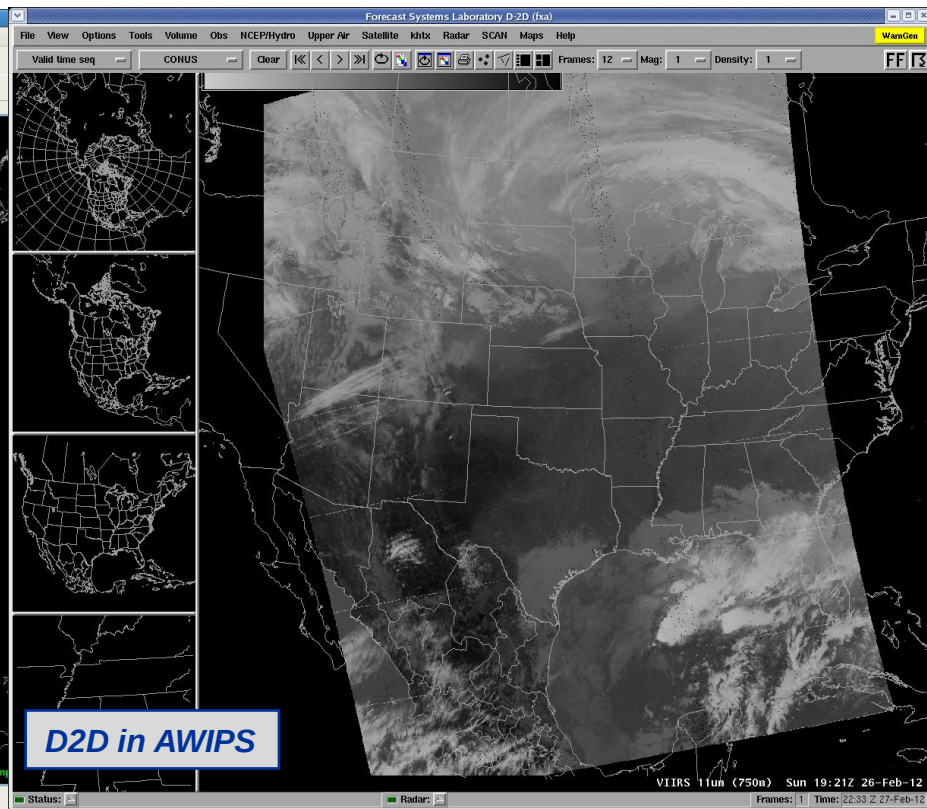
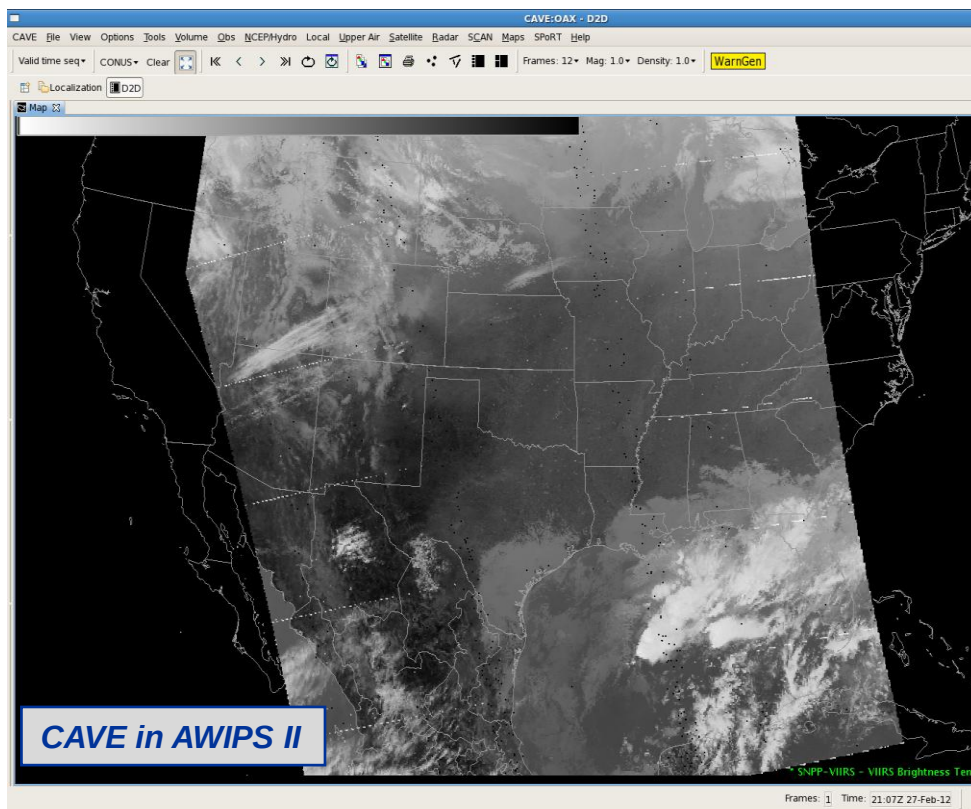
“...SEVIRI RGB Airmass product...show[s] the evolution of this wind event using surface observations (gusts in red). A PV advection jet is easy to discern punching into the cyclone center. This is evidence of a strong stratospheric intrusion associated with a developing PV anomaly and raises suspicion that it could play a significant role in the development of these sting jets.”



--WWoS Blog Post from OPC

Current SPoRT JPSS PG Product: VIIRS Imagery in AWIPS II

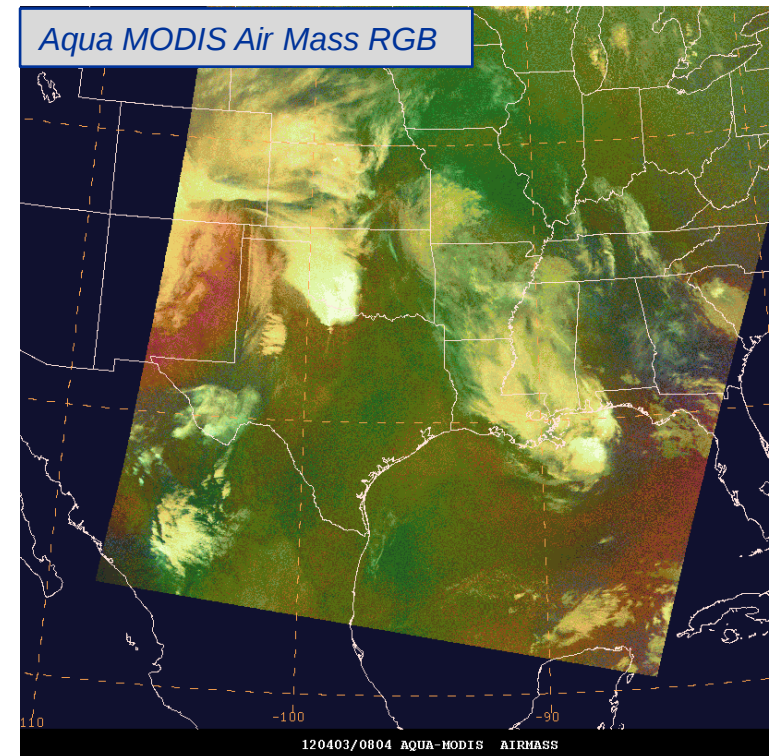
- Give forecasters an early look at VIIRS data from both Suomi-NPP and JPSS
- Provides wider swath and better resolution at scan edge



Images from Matt Smith and Frank LaFontaine

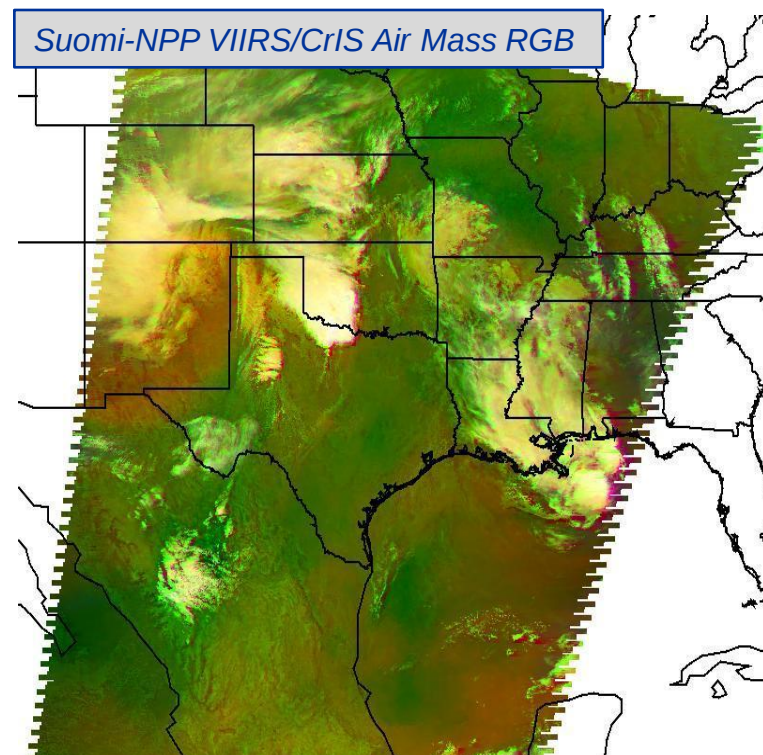
Current Status of SPoRT GOES-R PG Activities

- Real-time proxy data currently flowing to partner WFOs and National Centers
- Training complete for hybrid, PGLM, and selected RGB products
- 36 Wide World of SPoRT blog posts (32 by NWS staff) tagged “GOES-R Proving Ground” have been posted showing examples of these proxy data products in use



Current Status of SPoRT JPSS PG Activities

- Reformatted sample VIIRS imagery
 - Continue to work issues with image display
 - Product generation – hybrid, RGBs, etc.
- Established procedures to disseminate products to end users via LDM
- Direct broadcast capabilities for NPP instruments not routinely available
 - 10-16 hour latency results in limited utility to WFOs
- Evaluation partners ready to receive data
- Working to develop training
- Product assessment/impact when data flows to WFOs



Upcoming Work

- Continue training and targeted assessments of GOES-R proxy data (e.g. hybrid, RGBs, PGLM)
- Refine/enhance VIIRS imagery and products and expand dissemination to selected end users
- Access and disseminate additional products from VIIRS
- Continue developing AWIPS II plug-ins for SPoRT products
- Address additional forecast issues using other Suomi-NPP sensors
 - Real-time ozone mapping from OMPS/CrIS to better understand storm dynamics
 - Assimilation of CrIS/ATMS profile data for improved moisture analyses
 - Utilizing hyperspectral nature of CrIS to generate region-specific RGB products

